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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/550,598	04/17/2000	Hisashi Ohtani	0756-2119	1223

7590 10/23/2003

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EXAMINER	
CAO, PHAT X	

ART UNIT	PAPER NUMBER
2814	

DATE MAILED: 10/23/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/550,598	OHTANI ET AL.	
	Examiner	Art Unit	
	Phat X. Cao	2814	MW

-- The MAILING DATE of this communication app ars on the cover she t with the correspond nce address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *16 July 2003* .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-12,14,15,18 and 20-29* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-12,14,15,18 and 20-29* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) *3* .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

Claim Rejections - 35 USC § 112

1. Claims 3 and 15 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

In claims 3 and 15, the limitation of "forming an opening in said insulating layer **to expose** a portion of **the active layer** at a bottom of said opening; forming **an embedded conductive layer comprising a black colored material** to cover said insulating layer and said opening wherein **the embedded conductive layer contacts the active layer in the opening** (claim 3)" is a new matter. In the other words, the combination of forming an opening in the insulating layer **to expose** a portion of **the active layer** and then forming **a black colored embedded conductive layer in an opening for contacting the active layer** is not supported by the specification.

For example, Applicant's Fig. 5C discloses the forming of an opening in the insulating layer to expose a portion of the conductive layer 331 (but not a portion of the active layer as claimed) before forming a black colored embedded conductive layer 341 in the opening.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. Claims 1, 5, 7, 9, 14, 18, and 20-29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fukunaga et al (US. 5,706,064) in view of Liu et al (US. 5,536,950) and Izumi (US. 6,400,428).

With respect to claims 1, 5, 7, 9, 18, and 27-29, Fukunaga (Figs. 24A - 24G) discloses a method for producing a semiconductor device having an active matrix display device, comprising: forming a first conductive layer 405; forming an insulating layer (413,414) over the first conductive layer; forming an opening in the insulating layer to expose the first conductive layer 405 at a bottom of the opening; forming an embedded conductive layer 418 to cover the insulating layer and the opening (Fig. 24E); etching the embedded conductive layer 418 (Fig. 24F); and forming a second conductive layer on the insulating layer and the embedded conductive layer; and forming a pixel electrode 412 by patterning the second conductive layer (column 26, lines 46-48); wherein the embedded conductive layer 418 or 411b comprises an organic resin film made of polymer (column 26, lines 54-61) or carbon (column 20, lines 36-48) which is the same resin as the resin of the interlayer insulating film (column 19, lines 27-35 and column 20, lines 31-57), and wherein the embedded conductive layer 418 or 411b is further made of inorganic oxide conductive layer of ITO or ZnO (column 30, lines 43-46 and column 5, lines 66-67 through column 6, lines 1-3).

Fukunaga does not disclose the embedded conductive layer 418 is etched to expose a portion of the insulating layer.

However, Liu (Fig. 4G) teaches the steps of depositing the embedded conductive layer 82 in the opening, followed by planarization to expose the surface of the insulating layer 78 and depositing and patterning the pixel electrode 24 on the embedded conductive layer 82 (column 5, lines 30-39). Accordingly, it would have been obvious to

etch or polish the embedded conductive layer 418 of Fukunaga to expose a portion of the insulating layer in order to provide a unique body tie arrangement for achieving a compact and high reliability display, as taught by Liu (column 2, lines 57-67 through column 3, lines 1-12). Furthermore, it also would have been obvious to form Fukunaga's pixel electrode being either a transparent electrically conductive film or a reflective electrically conductive film depending upon the display device type which is desired for the liquid crystal display device, as taught by Izumi (column 6, lines 15-20).

With respect to claim 14, etching or polishing the embedded conductive layer 418 of Fukunaga by chemical mechanical polishing would have been obvious because it is well known in the art for planarizing the embedded conductive lug.

With respect to claims 20-26, Fukunaga also teaches (column 1, lines 5-30) that because the liquid crystal display device has high image quality and can be used as switching elements, this kind of display device has been widely used as a display device in a personal computer, television or the like. Accordingly, it would have been obvious to apply the display device of Fukunaga to a cellular phone, a camcorder, etc., because it is an intended use.

4. Claims 3, 6, 8, 10, and 20-26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fukunaga et al in view of Yamazaki (US. 5,990,542).

With respect to claims 3, 6, 8 and 10, Fukunaga (Fig. 22) discloses a method for producing a semiconductor device having an active matrix display device, comprising: forming an active layer 406 of a transistor; forming an insulating layer 413 over the active layer; forming an opening in the insulating layer (see Fig. 24D); forming an embedded conductive layer 411 comprising an organic resin film made of carbon (column 20, lines 36-48) or inorganic oxide conductive layer of ITO or ZnO (column 30, lines 43-46 and column 5, lines 66-67 through column 6, lines 1-3) to cover the

insulating layer 413 and the opening; forming a transparent conductive layer on the embedded conductive layer 411; patterning the transparent conductive layer to form a transparent pixel electrode 412 (column 26, lines 46-48).

Fukunaga's Fig. 22 does not disclose the opening extending to the active layer.

However, Yamazaki (Fig. 2B) teaches the forming of an opening extending to the active layer for providing the electrical contact between the pixel electrode and the active layer through the embedded conductive layer formed on the opening. Accordingly, it would have been obvious to form the opening of Fukunaga extending to the active layer in order to simplify the process of fabricating by providing the direct contact between the embedded conductive layer and the active layer.

With respect to claims 20-26, Fukunaga also teaches (column 1, lines 5-30) that because the liquid crystal display device has high image quality and can be used as switching elements, this kind of display device has been widely used as a display device in a personal computer, television or the like. Accordingly, it would have been obvious to apply the display device of Fukunaga to a cellular phone, a camcorder, etc., because it is an intended use.

5. Claim 15 is rejected under 35 U.S.C. 103(a) as being unpatentable over Fukunaga et al in view of Yamazaki and Jun (US. 6,043,149).

As discussed in details above, the combination of Fukunaga and Yamazaki substantially reads on the claim 15, except it does not disclose the step of polishing the embedded conductive layer by employing a chemical mechanical polishing.

However, Jun (Figs. 3b-3c) teaches the step of polishing the embedded conductive layer 35 by employing a chemical mechanical polishing. Accordingly, it would have been obvious to polish the embedded conductive layer 411 of Fukunaga (Fig. 22) by a well known method of chemical mechanical polishing for preventing a

recess from occurring in the embedded conductive layer, as taught by Jun (column 5, lines 18-21).

6. Claims 2 and 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fukunaga et al in view of Liu et al, Izumi and Kobayashi et al (US, 6,221,140).

As discussed in details above, the combination of Fukunaga, Liu and Izumi substantially reads on claims 2 and 11, except it does not disclose the embedded oxide conductive layer is formed by a spin coating method.

However, Kobayashi (column 2, lines 34-48) teaches the forming of an oxide conductive layer by a spin coating method to cover the substrate and the opening. Accordingly, it would have been obvious to form the embedded oxide conductive layer 418 (Fig. 24E) of Fukunaga with the method of spin coating because according to Kobayashi, such method is known for reducing in manufacturing cost (column 2, lines 24-33).

7. Claims 4 and 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fukunaga et al in view of Izumi, Jun (US. 5,948,705) and Kobayashi et al (US. 6,221,140).

Fukunaga (Figs. 24A - 24G) discloses a method for producing a semiconductor device having an active matrix display device, comprising: forming a first conductive layer 405; forming an insulating layer 413 over the first conductive layer; forming an opening in the insulating layer to expose the first conductive layer at a bottom of the opening; forming an oxide conductive layer of ITO or ZnO (column 30, lines 43-46 and column 5, lines 66-67 through column 6, lines 1-3) to cover the insulating layer and the opening; forming a second conductive layer 412 on the oxide conductive layer; and patterning the second conductive layer to form a pixel electrode. It is noted that forming

pixel electrode being either a transparent film or a reflective film would be obvious because it depends on the display device which is desired for the liquid crystal display device (see Izumi, column 6, lines 15-20).

Fukunaga does not disclose the step of etching the oxide conductive layer by using the second conductive layer as a mask.

However, Jun ('705) teaches a step of etching the embedded conductive layer 46' by using the second conductive layer 48 as a mask in a self-alignment manner (Figs. 4D - 4E and column 7, lines 25-30). Accordingly, it would have been obvious to modify the process of Fukunaga by forming the step of etching the embedded conductive layer 418 with the process as set forth above in order to prevent deterioration of the step coverage in the contact hole and the recess formation in the contact hole, as taught by Jun ('705) (column 7, lines 35-44).

Furthermore, in view of teachings of Kobayashi (column 2, lines 34-48), it also would have been obvious to form the embedded oxide conductive layer 418 of Fukunaga with the method of spin coating because according to Kobayashi, such method is known for reducing in manufacturing cost (column 2, lines 24-33).

Response to Arguments

8. Applicant argues that Fukunaga does not disclose that pixel electrode 412 is a light reflective.

However, the new reference is cited in the new ground of rejection to teach the obviousness of forming a pixel electrode as either light reflective or light transparent.

Applicant further argues that it is not obvious to combine Yamazaki with Fukunaga because there is no suggestion or motivation to combine them.

The Examiner recognizes that it is not necessary that the suggestion or motivation must be found within the four corners of the references themselves, a conclusion of obviousness may be made from common knowledge and common sense of the person of ordinary skill in the art without any specific hint or suggestion in a particular reference. *In re Bozek*, 416 F. 2d 1385, 1390, 163, USPQ 545, 549 (CCPA 1969). In this case, the combination of Fukunaga and Yamazaki would be obvious because providing the electrical contact to a transistor by forming of a conductive plug in direct contact with the active region of a transistor is a well known in the art, and such well known feature is taught by Yamazaki's Fig. 2B. Furthermore, in view of teaching of Yamazaki, forming the embedded conductive plug in direct contact with the active region 406 of the transistor by omitting of conductive layers 408 and 409 would be obvious because it has been held that omission of an element and its function in a combination where the remaining elements perform the same functions as before involves only routine skill in the art. *In re Karlson*, 136 USPQ 184.

Conclusion

9. this action is made non-final.

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Phat X. Cao whose telephone number is (703) 308-4917. The examiner can normally be reached on Monday - Thursday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wael Fahmy can be reached on (703) 308-4918. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

PHAT X. CAO
PRIMARY EXAMINER

PC

October 17, 2003